



HAL
open science

Outside the wild: Risks and mechanisms of host jumps of endive necrotic mosaic potyvirus

Marion Szadkowski, Catherine Wipf-Scheibel, William Billaud, Cecile Desbiez,
Jonathan Gaudin, Gregory Girardot, Patrick Gognalons, Judith Hirsch,
Thibaud Jayet, Sylvain Piry, et al.

► To cite this version:

Marion Szadkowski, Catherine Wipf-Scheibel, William Billaud, Cecile Desbiez, Jonathan Gaudin, et al.. Outside the wild: Risks and mechanisms of host jumps of endive necrotic mosaic potyvirus. 18. Rencontres de virologie végétale (RVV 2021), Cirad; INRAE, Sep 2021, Aussois, France. hal-03368388

HAL Id: hal-03368388

<https://hal.inrae.fr/hal-03368388>

Submitted on 11 Oct 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0
International License

Oral

Theme: Viral evolution

Student: no

Outside the wild: Risks and mechanisms of host jumps of endive necrotic mosaic potyvirus

Marion Szadkowski¹, Catherine Wipf-Scheibel¹, William Billaud^{1,2,3}, Cécile Desbiez¹, Jonathan Gaudin¹, Grégory Girardot¹, Patrick Gognalons¹, Judith Hirsch¹, Thibaud Jayet^{1,2}, Sylvain Piry^{1,4}, Loup Rimbaud¹, Alexandra Schoeny¹, Eric Verdin¹, Raphaël Forien⁵, Julien Papaïx⁵, Lionel Roques⁵, Benoît Moury¹, Karine Berthier¹

¹Pathologie Végétale, INRAE, 84140 Montfavet, France

²GAFL, INRAE, 84140 Montfavet, France

³Avignon Université, UMR Qualisud, 84916 Avignon, France.

⁴CBGP, INRAE, CIRAD, IRD, Institut Agro, Univ. Montpellier, Montpellier, France

⁵BioSP, INRAE, 84914 Avignon, France

Host jumps, the acquisition by a parasite of the capacity to infect novel host species, are frequent among plant viruses but still poorly understood. To investigate their mechanisms, we performed an experimental evolution of endive necrotic mosaic virus (ENMV) in five species of the family Asteraceae, including vegetable and ornamental crops, and analysed the incurred genetic changes.

ENMV is mostly confined to wild salsify (*Tragopogon pratensis*) and occasionally infects lettuce (*Lactuca sativa*). An ENMV isolate from *L. sativa* was serially passaged in one of five plant species (either *L. sativa*, *T. pratensis*, *Calendula arvensis*, *Zinnia elegans* or *Cichorium endivia*). For each species, six infection cycles were performed, with eight independent experimental replicas. Each of the evolved ENMV populations and the initial isolate were inoculated to the five plant species to measure their pathogenicity.

Changes (gains) in virus pathogenicity were observed in *C. arvensis* and *Z. elegans* only. Cross-adaptations between *C. arvensis* and *Z. elegans* were also observed. Parallel nonsynonymous substitutions (identical substitutions arising independently) were observed at three nucleotide positions in the VPg cistron of the adapted ENMV populations, and are candidates for the observed pathogenicity changes. Some of these were shared between *C. arvensis*- and *Z. elegans*-evolved populations, partly explaining the cross-adaptations.

These results indicate that ENMV is prone to jumping to novel host species, that cross-adaptations occur and may be linked to the genetic distance between host species and that these jumps may involve the VPg in a way similar to the breakdown of eIF4E-mediated resistance.